

UNIVERSITY OF QUEENSLAND

Computer Centre

NEWSLETTER

authorization: Director of the Computer Centre

1 SYSTEM PERFORMANCE

PERIOD FOR APRIL 1974

USEFUL TIME	318 HRS	85%
GOOD TIME	326 HRS	87%
ON TIME	375 HRS	100%

NO OF CRASHES	6
TIME BETWEEN CRASHES	54.27 HRS

2 COMPUTER CENTRE EXECUTIVE COMMITTEE

The Senate at its meeting of 28.3.74 approved the recommendations of the Computer Centre Executive Committee to abolish the existing Committee and replace it by -

- (i) A Computer Centre Management Committee and
- (ii) A Computing Policy Committee.

The Computer Centre Management Committee is a small management board for the Computer Centre which reports executively to the Deputy Vice-Chancellor (Fabric & Finance) and to the Vice-Chancellor of Griffith University in relation to specific services funded by that University. Membership is as follows:

- Deputy Vice-Chancellor (Fabric & Finance)
- Vice-Chancellor Griffith University or Nominee
- Chairman of Research Committee or Nominee
- Head of Department of Computer Science
- Director of Computer Centre

The Management Committee is responsible for ensuring that the Computer Centre is developed to meet the teaching, research and administrative needs of the University of Queensland and Griffith University. It will review levels of service offerings and related charge rates and make recommendations to the relevant authorities of both Universities on budget matters.

The Computing Policy Committee is more concerned with the coordinated development of computing services (including equipment and staff resources) over the whole of the University, having regard to central facilities, departmental equipment and use of external resources. It reports to the Professorial Board through the Education Committee. Membership of the Computing Policy Committee is as follows:

- (a) 5 Members of the Computer Centre Management Committee
- (b) 9 Representatives from relevant Faculties appointed by the Deans
- (c) Deputy Vice-Chancellor (Academic)
- (d) Registrar

Senate also approved the functions of the Computer Centre as follows:

#### Computer Operations

- (a) Provide a time shared and batch computing service at prescribed charges to users, over such hours of operation as are necessary to meet demand.
- (b) Provide a data preparation and entry service for users at prescribed charges.
- (c) Maintain operating software including monitor, language compilers and utility programs.

#### Engineering Services

- (a) Maintain central computer and communications equipment in a reliable state.
- (b) Install and test new equipment and develop any special interfaces required to allow the establishment of additional equipment.
- (c) Reduce overall University expenditure by provision of a central maintenance service on computing and communications equipment.

### Systems and Programming Services

- (a) Promote the more efficient use of computer facilities throughout the University by specialised consulting assistance, survey and development of general use programs and development of specific programs on behalf of users (at prescribed charges).
- (b) Provide a specialist service to assist departments with interfacing on-site computers with on-line experimental situations.

### Planning and Development

- (a) Assess hardware and software facilities necessary to meet the future requirements of the University, having regard to volume and nature of computing work.
- (b) Assist the University generally in the development of a total campus approach to computing, so that best use is made of resources and state-of-art developments in hardware and software.
- (c) Develop special software and systems (particularly communications) to meet the particular needs of the University of Queensland and Griffith University.

## 3 NEW FORTRAN COMPILER - F10

### 3.1 Availability of F10

The new Fortran compiler, names F10 (which was mentioned in an earlier newsletter), is now available for general use on the system. This new compiler has a number of features, not available in the current Fortran (F40) including -

- (a) Comprehensive I/O and file processing capabilities
- (b) Multiple entry points to subroutines
- (c) A 'Name list' capability
- (d) Multiple statement lines
- (e) An optimiser which allows the user to specify the degree of optimization of the object code produced by the compiler and hence the efficiency of program execution.

### 3.2 Compatibility of F10 and F40

Because of the differences between the F10 and F40 compilers, and in the code they produce, the new F10 compiler is not completely "upwards compatible" with F40, i.e. Fortran source programs written for the F40 compiler may NOT necessarily compile and execute correctly with the new F10 compiler.

So as to minimise any consequential "changeover" problems for the user (either explicit or inadvertant) the Centre will provide and support two Fortran compilers, F40 and F10, with F40 being the standard system default compiler. This arrangement will continue for a minimum of two years.

Even so, users will still encounter some problems if they attempt to mix relocatable binary files compiled with different compilers and must adopt special procedures to handle this situation (ref: section 3.5).

### 3.3 F10 Implementation

To enable simple use of either compiler, while preserving F40 as a default, the Centre has modified the system to operate as follows:

#### 3.3.1 File Extension

A new extension .F10 has been introduced to indicate Fortran source program files written for the F10 compiler.

When using any of the COMPIL commands COMPILE, EXECUTE, LOAD ...

- (a) Files with extensions of .F4, .FOR or a null extension will be compiled with the F40 compiler.
- (b) Files with extensions .F10 will be compiled with the new F10 compiler.

#### 3.3.2 Batch Commands

A new command \$F10 has been added for batch processing.

- (a) Source decks preceded by a \$F4 or \$FORTRAN command will be processed by the F40 compiler.
- (b) Source decks preceded by a \$F10 command will be processed by the F10 compiler.

### 3.3.3 Switches

In the cases of the COMPIL type commands, and \$FORTRAN in batch, it is possible to follow the command with a /F10 switch to force the use of the new F10 compiler if desired.

The above system will allow existing files and procedures to run without change using the F40 compiler while the new F10 compiler can be used easily and unambiguously.

### 3.4 Which Compiler to Use?

In deciding which compiler to use for a given problem, the user should give some consideration to the following points:

#### 3.4.1 Facilities

As indicated in section 3.1, the new F10 compiler has many extended facilities which could prove very useful in a given problem.

#### 3.4.2 Standards and Transportability

Many of the new features in F10 are not within the ANSI standards for Fortran, nor are they found in the Fortrans available on other machines.

Fortunately the DEC documentation for F10 clearly indicates the non-ANSI standard features. If there is any likelihood of the user's program being used on another machine, the non-standard features should be avoided to simplify transfer.

#### 3.4.3 Costs

Preliminary tests by the Centre have shown that compilations by F40 are cheaper than those by F10. Although the optimiser is available for F10, execution of F40 compiled code is often cheaper than F10 compiled and optimised code.

#### 3.4.4 Stability

The current version of F40 (version 26) is now relatively 'old'. As no further versions of this compiler will be released or implemented, it is stable and, while it contains some errors, these are known, documented and can be avoided. By comparison, F10 at version 1A is still in its infancy. Tests have shown that it is far from being error free, and new versions may be implemented as they become available.

### 3.5 Mixed Code

As indicated in section 3.2, users will encounter problems when attempting to mix the compiled code of both compilers into one core image. For example, if a user tries to load his mainline program, compiled by F10, with say SSP library subroutines, which were compiled with F40, the run will fail. This situation can be handled by using the new LINK10 loader with the /MIXFOR switch.

example:        .RUN NEW:LINK  
                 \*PROG.REL,STATS:SSP.REL /SEARCH /MIXFOR /GO

The LINK10 loader is documented in edition 3 of the DEC Assembly Language Handbook. Users should be aware that most current library programs have been compiled with F40.

### 3.6 Effects on other Software

It is worth noting the implications of F10 for other items of software.

#### 3.6.1 Plotter Software

The basic plotter software is considered an integral part of the system software. It is currently being modified to operate correctly with the new Fortran operating system FOROTS. Plotter routines will then be available using the procedure of section 3.5 above with F10 compiled mainline programs.

#### 3.6.2 Overlays

The overlay loader OVLOAD will handle either F40 or F10 compiled programs, but NOT a mixture of both as described in 3.5 above. In due course DEC intend to produce an overlay capability in their LINK-10 loader which may handle that situation. However, no availability date is known for that version of LINK-10.

## 4 COBDDT

A new version of COBDDT was released on the 10 April. The major purpose of this release was to include a histogram capability into COBDDT. If required, COBDDT will produce a histogram report on program paragraph utilization. Details are as follows:

## Histograms of COBOL paragraph utilization

A continual concern of every programmer is to produce programs which operate as efficiently as practicable on the system for which they are designed. This is not an easily realizable goal, however, since the programmer usually does not know what portion of a given program is utilizing the greatest share of a given system resource. Hence, the programmer is illequipped to know where to apply his efforts most productively to increase the efficiency of the program. The capability of COBDDT to maintain and report a histogram of the number of times each paragraph in a COBOL program was entered as well as the total amount of processor and elapsed time spent in it should provide the programmer the information he needs to determine where he can most effectively influence the efficiency of his program.

There are four commands available in COBDDT to allow the programmer to construct and output histograms of his program's behaviour. They are:

(i) HISTORY INITIALIZE

This command sets up and initializes (zeroes all entries) the histogram table.

(ii) HISTORY START

This command causes statistics to be gathered for each paragraph subsequently entered. The statistics collected are:

- (a) The number of times each paragraph is entered.
- (b) The CPU time spent within each paragraph.
- (c) The elapsed time spent within each paragraph.

(iii) HISTORY STOP

This command causes the cessation of the gathering of statistics. Hence the combination of START and STOP commands allows a programmer to produce partial histograms of his program.

(iv) HISTORY REPORT

This command causes COBDDT to output the available statistics in a fixed format. The report will be output to logical device HISTOR if it exists, or to the users terminal if HISTOR has not been assigned a device. If HISTOR has been assigned to a directory device, the report will be given the name REPORT.000.

The format of the report is such that it may be sorted into ascending or descending sequence on any field using the field definition below:

Contents of field	SORT field description
Paragraph name	1.30
Number of executions	34.11
CPU time	46.12
Elapsed time	59.12

Full details on this new facility can be obtained from the Computer Centre.

5      STATUS REPORT ON FORTRAN SYSTEM CHANGES (3 May '74)

Conversion to the new Fortran system has now been made - not unfortunately without problems. Listed below are areas in which problems have been encountered, together with suggestions as to how these may be overcome.

- (a) Card decks containing a mixture of 026 and 029 cards. The CDRSTK switch /MIX will cause these decks to be correctly read.

example:      \$FORTRAN /MIX  
                 or      \$FORTRAN MYPROG.F4 /MIX  
                 or      \$DECK PROG.F4 /MIX  
                 or      \$DATA /MIX

- (b) Overlays are now handled properly by the new system,



- (c) Problems with plotting have not yet been fully overcome and users should use the old Fortran operating system in this instance,

for example:

.EX /REL/OLD MYPROG,PLOT:CALCMP/LIB

It is expected that a compatible version of the CALCMP library will be available within three weeks.

6     "COMPUTER COMPOSERS"

As part of the First Queensland Festival of the Arts being held in Brisbane during May, "COMPUTER COMPOSERS" is a display of Computer Art, Music and Films. This display can be seen on the 4th Floor, M.I.M. Building, Ann Street, Brisbane, from the 7th to 17th May during the hours of 10 a.m. and 4 p.m.

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